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***Angularella audubonensis* sp. n. (Dilepididae) and Other Cestodes of Cliff Swallows in Colorado**

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ABSTRACT: One hundred forty-five cliff swallows, *Petrochelidon pyrrhonota*, were examined for cestodes in two separate surveys in Weld County, Colorado. Seven species representing four genera were found. *Angularella audubonensis* sp. n. is differentiated by the small size of the rostellar hooks (8.4–13.5 μ m) and the medial relationship of the cirrus pouch to the osmoregulatory canals. Other species collected were *Angularella beema*, *Anonchotaenia globata*, *Mayhewia ababili*, *Vitta magniuncinata*, *Vitta parvirostris* and *Vitta riparia*. Seven new hosts and geographic distribution records were established for Colorado, and six new records were determined for North America.

Only one paper (Kayton and Schmidt, 1975) has been published on helminths of the cliff swallow, *Petrochelidon pyrrhonota*. That study, however, omitted cestodes. In order to determine a more complete picture of parasitism of this bird in Colorado, we examined 145 swallows for cestodes and report the results herein.

Materials and Methods

Cestodes were relaxed in tap water, fixed in AFA or 10% formalin, and stained with acetocarmine.

Illustrations were completed with the aid of a camera lucida. All measurements are in micrometers unless otherwise indicated.

Seven species of cestodes were identified: *Angularella audubonensis* sp. n., *Angularella beema* (Clerc, 1906) Strand, 1928; *Anonchotaenia globata* Linstow, 1879; *Mayhewia ababili* (Singh, 1952) Yamaguti, 1956; *Vitta magniuncinata* Burt, 1938; *Vitta parvirostris* (Krabbe, 1869) Baer, 1959; and *Vitta riparia* (Dubinin, 1953) Spasskaya, 1966. All were new host records for the cliff swallow, and Colorado, and all except *A. globata* are new for North America. One species of *Angularella* Strand, 1928 is new to science and forms the basis of the following description.

***Angularella audubonensis* sp. n. (Figs. 1–5)**

Five complete specimens and several fragments were recovered from the small intestines of seven of 145 cliff swallows collected from May–August 1978, 1979, 1980.

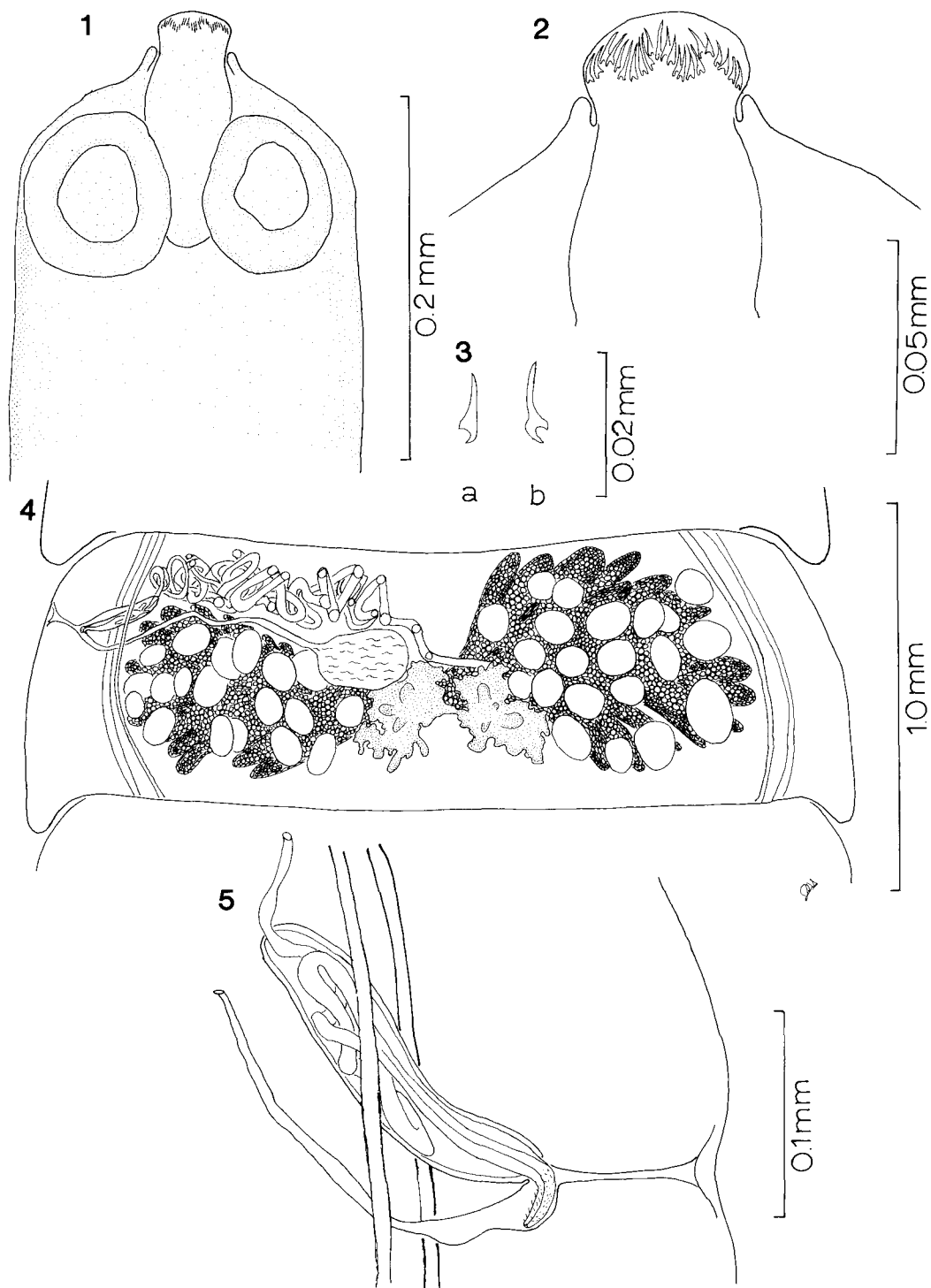
DESCRIPTION: Dilepididae, Dilepidinae. Length of strobila about 44 mm long, 196 wide at base of scolex and reaching a maximum width of about 1,800 ($N = 5$) in the posterior gravid proglottids. Proglottids craspedote, wider than long. Scolex (Fig. 1) 186–210 ($N = 5$) at level of suckers. Four muscular, aspinose suckers measure 76–102 long by 72–115 wide ($N = 14$); circular to oval in shape. Rostellum (Fig. 2) 39–41 wide at apex,

93–110 long ($N = 5$), armed with 52–56 hooks ($N = 2$) arranged in zigzag formation in a single row. Hooks (Fig. 3) 8.4–13.5 ($N = 60$) long with the longer hooks at the posterior position of the zigzag and shorter hooks at the anterior position. Undifferentiated neck region measuring 50–104 ($N = 5$) from base of rostellar pouch to first segmentation (Fig. 4). Genital pores alternate irregularly, in anterior third of proglottid. Cirrus pouch (Fig. 5) muscular, double-walled, 165–200 long, 40 ($N = 65$) maximum width. Cirrus pouch passes between osmoregulatory canals at approximately its midpoint. Cirrus armed with minute spinules less than 1 in length. Vas deferens highly convoluted, extending to midline of anterior third of proglottid. Testes number from 26–47; ovoid, 37–40 wide by 60–70 ($N = 170$) long and are interspersed throughout proglottid, rarely anterior to ovary or vagina. Vagina posterior to cirrus pouch and vas deferens, 100–116 ($N = 70$) long, about 5 wide, curving slightly posteriad between dorsal and ventral osmoregulatory canals. Vagina expands into prominent, oblong seminal receptacle 210–211 long, 79–86 ($N = 70$) wide. Seminal receptacle slightly poral and medial, anterior to vitellarium. Ovary bilobed, often occupying most of mature proglottid, sometimes with fingerlike projections extending past the osmoregulatory canals. Vitellarium lobated, 277–313 wide, 116–121 ($N = 70$) long, posterior to seminal receptacle between lobes of ovary. Uterus sac-like, developing quickly, occupying entire proglottid when gravid. Eggs 23–31 long by 14–23 ($N = 70$) wide.

HOST: *Petrochelidon pyrrhonota* (Veillot, 1817) (Passeriformes: Hirundinidae).

LOCALITY: Weld County, Colorado.

HABITAT: Duodenum.



Figures 1-5. *Angularella audubonensis* sp. n. from *Petrochelidon pyrrhonota*. 1. Scolex, dorsoventral view. 2. Rostellum with hooks. 3. Hooks. a—small hook; b—large hook. 4. Mature proglottid. Large oval structures are testes. 5. Close-up of cirrus pouch and vagina from mature proglottid.

Table 1. Characteristics of *Angularella* spp. (data after original authors).

Characteristic	<i>A. beema</i> (Clerc, 1906) Strand, 1928	<i>A. hirundina</i> (Fuhrmann, 1907) Spasskaya and Spasskii, 1971	<i>A. urbica</i> Spasskaya and Spasskii, 1971	<i>A. ripariae</i> Yamaguti, 1940	<i>A. audubonensis</i> sp. n.
Number of hooks	56–66	56	48	40	52–56
Length of hooks	22–29	19–20	18–23	27	8.4–13.5
Number of testes	20–42	28	45	32–45	26–47
Cirrus pouch	133–175 × 39	117–140 × 28	247 × 33	75–90 × 33–63	165–200 × 40
Uterus	Sac-like, lobated	Lobated	Lobated margins	Sac-like, filling entire segment	Sac-like, filling entire segment

TYPE SPECIMENS: USNM Helm. Coll. holotype no. 77136, paratype no. 77137.

ETYMOLOGY: The species is named in honor of the Greeley, Colorado Audubon Society, who encouraged and helped fund this research.

REMARKS: *Angularella audubonensis* differs from four species, *A. beema* (Clerc, 1906) Strand, 1928; *A. hirundina* (Fuhrmann, 1907) Spasskaya and Spasskii, 1971; *A. urbica* Spasskaya and Spasskii, 1971; and *A. ripariae* Yamaguti, 1940, by the size of its rostellar hooks, those being much smaller (8.4–13.5 μ m) than any reported from the other species (Table 1). The cirrus pouch

passes between the dorsal and ventral osmoregulatory canals and extends medially past them, whereas those of all the other species are completely poral to the canals. *Angularella audubonensis* most closely resembles *Angularella beema* in the number and arrangement of hooks, number of testes, and the highly convoluted nature of the vas deferens.

Literature Cited

Kayton, R. J., and G. D. Schmidt. 1975. Helminth parasites of the cliff swallow, *Petrochelidon pyrrhonota* Vieillot, 1817 in Colorado, with two new species. J. Helminthol. 49:115–119.